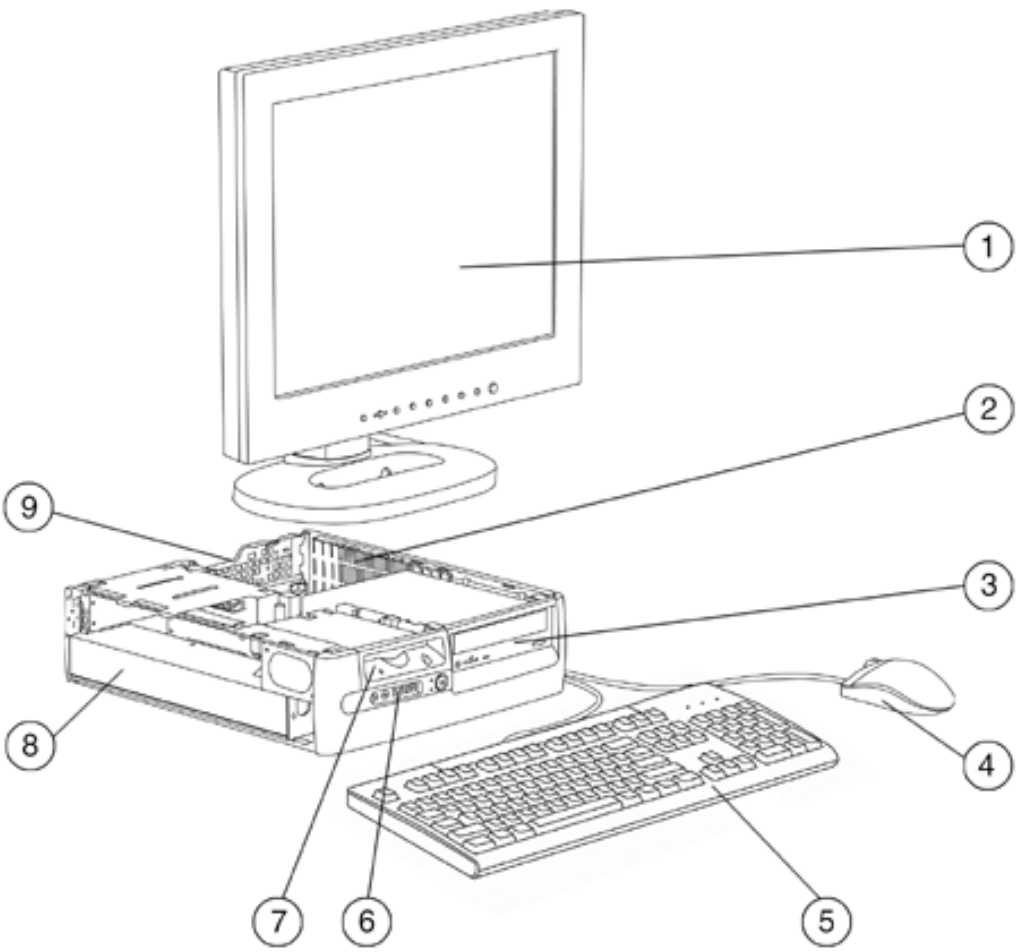
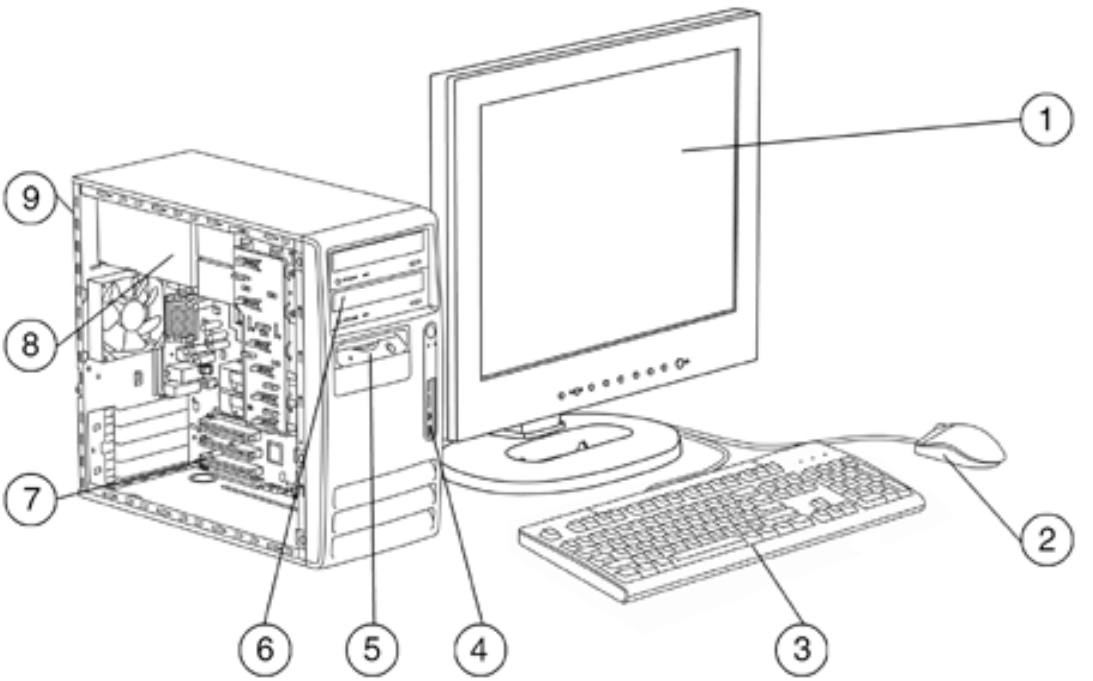
Small Form Factor



1. Monitor (sold separately)
2. 3 low profile PCI slots
3. 1 3.5" internal bay and 1 5.25" external bay
4. 2-Button Scroll Mouse
5. 2004 Standard Keyboard
6. 2 USB 2.0, headphone and microphone
7. 3.5" external bay for optional diskette drive or other 3.5" device
8. 185-watt power supply
9. 4 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, audio in/out

Overview

Microtower



1. Monitor (sold separately)
2. 2-Button Scroll Mouse
3. 2004 Standard Keyboard
4. 2 USB 2.0, headphone and microphone
5. 3.5" external bay for optional diskette drive or other 3.5" device
6. 2 internal 3.5" bays, 2 external 5.25" bays and 2 external 3.5" bays
7. 3 full-height PCI slots
8. 240-watt power supply
9. 4 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, 2 PS/2, 1 RJ-45, 1 VGA, audio in/out

At A Glance

- Intel® Pentium® 4 and Celeron-D® processors
- Operating System:
  Microsoft Windows XP Professional
- Intel 865GV chipset with Intel Extreme 2 integrated graphics
- Integrated Broadcom NetXtreme Gigabit ethernet
- 800, 533 and 400-MHz processor front side bus support, depending on processor
- Intel HyperThread support
- SMART III Ultra ATA/100 Hard Drives
- SoundMax Digital AC97 integrated audio with internal speaker
- Pre-loaded Manageability tools
- Energy Star compliance with energy-saving features
- Protected by HP Services, including a 3-3-3 standard warranty. Terms and conditions vary by country. Certain restrictions and exclusions apply. For details, consult the Product Information Centre at 1-888-882-6672.

HP Compaq Business Desktop dc5000

All dc5000's come with:
- Intel 865GV chipset
- Microsoft Windows XP Professional
- Integrated Intel Extreme 2 graphics
- Integrated Broadcom NetXtreme Gigabit Ethernet for HP
- Integrated AC97 audio

Model Key

Example: c50sm/P3.0E/120d+nyr/256G/4tMQ

c500s	c5000 small form factor
c500m	c5000 microtower
Processor Speed	
C2.6	Celeron-D-330 2.6GHz (400MHz)
C2.8	Celeron-D-335 2.8GHz (400MHz)
P2.8E	P4 2.8EGHz (800MHz)
P3.0E	P4 3.0EGHz (800MHz)
P2.8A	P4 2.8AGHz (533MHz)
Hard Drive	
40	Hard Drive Size
80	Hard Drive Size
160	Hard Drive Size
b	7200 RPM Hard Drive Speed
Removable Storage	
c	CD-ROM
d	DVD-ROM
q	DVD+RW
r	CDRW
w	DVD/CDRW combo
z	ZIP drive
y	Disk-on-key
f	floppy
n	no floppy
Memory Size	
128	Memory size
256	Memory size
512	Memory size
1	Memory size
2	Memory size
3	Memory size
4	Memory size
Memory Speed	
d	PC2700 (single channel)

e	PC2700 (dual channel)
f	PC3200 (single channel)
g	PC3200 (dual channel)
OS	
4	Microsoft Windows XP Professional
Software Applications	
o	Office Professional
t	Office Personal
e	Office SBE
b	Office Basic
u	MS Works 7.0 (NA only)
NIC	
M	Modem
Blank	integrated NIC
Other	
Blank	not included
O	2nd Serial Port

English	French	
Small Form Factor		
PB518A#ABA	PB518A#ABC	c500S/C2.6/40bcn/256E/4
PB475A#ABA	PB475A#ABC	c500S/P2.8/40bcn/256E/4
PB480A#ABA	PB480A#ABC	c500S/P2.8/40bwn/512E/4
PB481A#ABA	PB481A#ABC	c500S/P3.0/40bcn/256G/4
PB484A#ABA	PB484A#ABC	c500S/P3.0/40bwn/512G/4
PB483A#ABA	PB483A#ABC	c500S/P3.0/40bdn/512G/4
Microtower		
PB463A#ABA	PB463A#ABC	c500M/P2.8/40bcn/256E/4
PB469A#ABA	PB469A#ABC	c500M/P3.0/40bcn/256G/4
PB472A#ABA	PB472A#ABC	c500M/P3.0/40bwn/512G/4
Promotional Small Form Factor Products		
PJ352UA#ABA	PJ352UA#ABC	c500S/P2.8/40bnc/256F/4
PP209UA#ABA	PP209UA#ABC	c500S/P2.8/40bnd/512F/4
PP208UA#ABA	PP208UA#ABC	c500S/P3.0/80bnd/512F/4
PP207UA#ABA	PP207UA#ABC	c500S/P3.0/80bnw/512F/4
Promotional Microtower Products		
PJ104UA#ABA	PJ104UA#ABC	c500M/P2.8E/40bnc/256F/4
PJ103UA#ABA	PJ103UA#ABC	c5000M/P2.8E/40bnd/512F/4
PJ102UA#ABA	PJ102UA#ABC	c5000M/P3.0E/80bnd/512F/4
PJ101UA#ABA	PJ101UA#ABC	c500M/P3.0E/80bnw/512F/4

Standard Features

	Small Form Factor	Microtower
Operating System (choice)		
Microsoft Windows NT 4.X	— (drivers available on web – Softpaqs Only)	— (drivers available on web – Softpaqs Only)
Microsoft Windows 2000 SP3	— (drivers available on web – Softpaqs Only)	— (drivers available on web – Softpaqs Only)
Microsoft Windows XP Professional SP1a	X	X
Microsoft Windows XP Home SP1a	X	X
Processor	Intel Pentium 4, Intel Celeron-D	
CPU Bus Speed Supported	800-MHz, 533-MHz or 400-MHz FSB, depending on processor	
Standard L2 Cache	128-KB or 1024-KB non-ECC, depending on processor	
Chipset	Intel 865GV	
Memory Expansion Slots	4 DIMM's	
Memory Type Supported	DDR (ECC not supported by Chipset)	
Memory Speed Supported	DDR Synch DRAM PC2100 (266-MHz) non-ECC or DDR Synch DRAM PC2700 (333-MHz) non-ECC or DDR Synch DRAM PC3200 (400MHz) non-ECC	
Maximum Memory	4-GB	
Network controller	Integrated Broadcom NetXtreme Gigabit ethernet for HP	
Graphics	Integrated Intel Extreme Graphics 2	
Audio	Integrated digital audio with S/PDif 6-channel pass-through, stereo microphone, active noise cancellation and Yamaha XG Lite Softsynth support	
PCI slots	3 low profile	3 full-height slots on PCA
AGP slot	none	
Bays	Total Bays = 3	Total Bays = 6
Internal Bays	(1) 3.5 inch ATA Hard Drive	(2) 3.5 inch ATA Hard Drive
External Bays	(1) 5.25 inch half-height (1) 3.5 inch third-height	(2) 5.25 inch half-height (2) 3.5 inch third-height
Parallel Port	1	
Serial Port	1 – with 2nd available as option	
Front I/O	Front Headphone, Microphone, and 2 USB 2.0 Standard	
Rear I/O	4 USB, 1 standard serial port, 1 optional serial port, 1 parallel port, PS/2 keyboard and mouse, 1 RJ-45, 1 VGA, Audio In, Audio Out/Headphone, Mic In	
USB Keyboard	Optional	
USB Mouse	Optional	
PS/2 Keyboard	1	
PS/2 Mouse	1	
VGA Adapter	1	
Chassis Dimensions (H x W x D) Inches	3.95 x 13.3 x 15.1 In tower position with stand: 14.4 x 3.95 x 15.1	14.5 x 6.88 x 16.31
System Weight	22.2 lb	24 lb
System Volume	13 liters	27 liters
Shipping Weight	29 lb	34 lb
Weight Supported	75 lb	NA
Power Supply	185W Power Supply - PFC (115v/230v line switch)	240W ATX Power Supply - PFC (115v/230V line switch)
Hard Drive Interfaces Supported	2 ULTRA ATA/100 interfaces	

Standard Features

Hard Drive Controller (PCI) Supported	ULTRA ATA 100/66/33	
Preinstalled Software		
Computer Setup Utility	X	X
Diagnostics for Windows	X	X
Microsoft Internet Explorer	X	X

After-Market Options

		SFF	MT	Part Number
Communications	**Wireless LAN**			
	HP USB Bluetooth transceiver	X	X	DN650A
	HP WL220 PCI (802.11b) WiFi wireless LAN	X	X	DC756B
	HP WL500 PCI (802.11a/g) WiFi wireless LAN	X	X	DV649A
	PCI high speed 56K Win Modem (includes Low Profile bracket)	X	X	DC131A
Hard Drives	**ATA/100 Hard Drives**			
	40-GB ATA/100 Hard Drive (7200 rpm)	X	X	DC180A
	80-GB ATA/100 Hard Drive (7200 rpm)	X	X	DC181A
	160-GB ATA/100 Hard Drive (7200 rpm)	X	X	DC189A
Input/Output Devices	**Keyboards**			
	HP PS/2 Standard Keyboard (Carbonite/Silver)	X	X	DT527A#ABA
	HP USB Standard Keyboard (Carbonite/Silver)	X	X	DT528A#ABA
	Pointing Devices			
	HP PS/2 2-Button Scroll Mouse (Carbonite)	X	X	DD440B
	HP USB 2-Button Optical Scroll Mouse (Carbonite/Silver)	X	X	DC172B
Memory (DIMMs)	**333-MHz (PC2700) DDR DIMMs Non-ECC**			
	1-GB DDR Synch Dram PC2700 (333-MHz) Non-ECC	X	X	DC341A
	512-MB DDR Synch Dram PC2700 (333-MHz) Non-ECC	X	X	DC340A
	256-MB DDR Synch Dram PC2700 (333-MHz) Non-ECC	X	X	DC339A
	128-MB DDR Synch Dram PC2700 (333-MHz) Non-ECC	X	X	DC338A
	400-MHz (PC3200) DDR DIMMs Non-ECC			
	1-GB DDR Synch Dram PC3200 (400-MHz) Non-ECC	X	X	DE468A
	512-MB DDR Synch Dram PC3200 (400-MHz) Non-ECC	X	X	DE467A
	256-MB DDR Synch Dram PC3200 (400-MHz) Non-ECC	X	X	DE466A
	128-MB DDR Synch Dram PC3200 (400-MHz) Non-ECC	X	X	DE465A

After-Market Options

Monitors	**TFTs**			
	HP L2335 Flat Panel Monitor (23" widescreen)	X	X	P9615A#ABA
	HP L2035 Flat Panel Monitor (20")	X	X	P9614A#ABA
	HP L1925 Flat Panel Monitor (19" analog/digital)	X	X	P9626A#ABA
	HP L1730 Flat Panel Monitor (17" analog/digital & multimedia)	X	X	P9625A#ABA
	HP L1530 Flat Panel Monitor (15" analog/digital & multimedia)	X	X	P9624A#ABA
	HP L1702 Flat Panel Monitor (17" analog only)	X	X	P9621D#ABA
	HP L1502 Flat Panel Monitor (15" analog only)	X	X	P9617D#ABA
	CRTs			
	HP p1230 CRT Monitor (22" natural flat)	X	X	P9613A#ABA
	HP v7550 CRT Monitor (17" flat-face)	X	X	P9013A#ABA
	HP s9500 CRT Monitor (19")	X	X	P9010A#ABA
Multimedia	JBL Platinum Series Speakers (Carbonite)	X	X	DE893B#ABA
	IEEE1394 Firewire PCI card		X	DE471A
	HP Desktop Access Center	X	X	DK985A
Optical Drives	*DVD-ROM Drive*			
	16X/40X DVD-ROM w/ +R read	X	X	DC151B
	CD-ROM Drive			
	48X Max CD-ROM Drive	X	X	DC143B
	CD-RW Drive			
	48X/32X/48X CD-RW Drive	X	X	DL975B
	Combo Drive			
	48X/32X Combo DVD-ROM/CD-RW Drive	X	X	DL976B
	Floppy Drive			
	1.44MB Internal Floppy Disk Drive	X	X	DS710B
Removable Storage	**Drive Key Options**			
	256-MB HP Drive Key (USB 2.0)	X	X	DL973B
	Zip Drives and Media			
	Zip 250 Drive	X	X	DC140B
	Zip 750 Drive	X	X	DC518B
Graphics Controllers	NVIDIA Quadro4 280NVS 64MB DDR Dual Head (with VGA Y-cable) PCI graphics card	X	X	DY599A
	NVIDIA DVI dual-head connector cable for DY599A (DMS59 compatible)	X	X	DL139A

After-Market Options

Security	HP Business PC Security Lock Kit		X	X	PV606AA
Bezels and filler panels	5.25" blank bezel kit (Carbonite 50/PK)		X	X	DC177B
Brackets/Stands	SFF Wall Mount Bracket		X		DK412A
	Tower stand (Carbonite)		X		DE870A
Other Devices	2nd serial port		X	X	DP443A
	PCI to PCMCIA Universal adapter for 3.5 inch bay		X	X	DC680B
HP Care Pack Services	Next Business Day Onsite, HW Support, CPU Only, 4 yrs	X	X	X	U7897E
	Next Business Day Onsite, HW Support, CPU Only, 5 yrs	X	X	X	U7899E
	Next Day Onsite Response, 4 yrs	X	X	X	U7896E
	Next Day Onsite Response, 5 yrs	X	X	X	U7898E
	4-Hour, 9x5 Onsite, HW Support, CPU only, 3 yrs	X	X	X	U4863E
	4-Hour, 9x5 Onsite, HW Support, CPU only, 4 yrs	X	X	X	U7902E
	4-Hour, 9x5 Onsite, HW Support, CPU only, 5 yrs	X	X	X	U7904E
	Basic 8-5, 4-Hour Onsite Response, 3 yrs	X	X	X	U4864E
	Basic 8-5, 4-Hour Onsite Response, 4 yrs	X	X	X	U7901E
	Basic 8-5, 4-Hour Onsite Response, 5 yrs	X	X	X	U7903E
	4-Hour Onsite Response, 24x7, CPU Only, 3 yrs	X	X	X	H4493E
	4-Hour Onsite Response, 24x7, CPU Only, 4 yrs	X	X	X	U7906E
	4-Hour Onsite Response, 24x7, CPU Only, 5 yrs	X	X	X	U7908E
	4-Hour Onsite, Extended Hours Response, 3 yrs	X	X	X	U5868E
	4-Hour Onsite, Extended Hours Response, 4 yrs	X	X	X	U7900E
	4-Hour Onsite Response, 24x7, 3 yrs	X	X	X	H4483E
	4-Hour Onsite Response, 24x7, 4 yrs	X	X	X	U7905E
	4-Hour Onsite Response, 24x7, 5 yrs	X	X	X	U7907E
	Post Warranty Service, Next Day Onsite, CPU Only	X	X	X	U5864PE
	Post Warranty Service, Next Day Onsite	X	X	X	U5865PE
	Installation for 2+ HP Desktop or Laptop; Basic, 1 yr	X	X	X	U5870E

Installation for 1 HP Desktop or Laptop; Basic, 1 yr	X	X	X	U5869E

NOTE: For additional information on HP Care Pack Services, please see http://www.hp.ca/hps/carepack/.

865G chipset

DDR SYNCH DRAM Non-ECC Memory

It is not necessary to add memory in pairs. Memory upgrades are accomplished by adding single or multiple DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations. The Intel 865GV chipset supports non-ECC 266-MHz (PC2100), non-ECC 333-MHz (PC2700) and non-ECC 400MHz (PC3200) DDR memory.

For best performance, add in pairs, add in same channel, and do not mix speeds. For dual-channel performance, DIMMs must be same size, same DRAM technology, same DRAM bus width, and either all single-sided or double-sided DIMMs. Brand and timing specs are not an issue. If speeds are mixed, speed will default to the slowest DIMM.

Maximum Memory (small form factor and microtower)

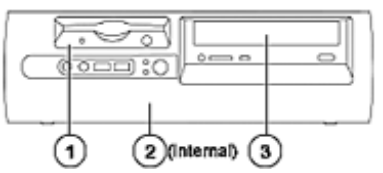
Supports up to 4-GB of DDR SYNCH DRAM

Possible Memory Configurations (small form factor and microtower)

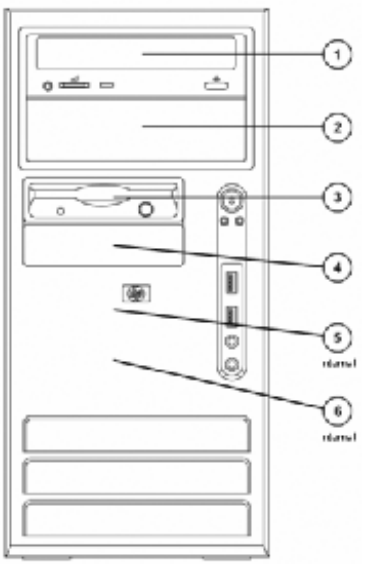
Not all memory configurations possible are represented below.

DIMM Size	Slot			
	Channel A		Channel B	
	1	2	3	4
128-MB	128-MB			
256-MB	128-MB		128-MB	
512-MB	512-MB			
512-MB	256-MB		256-MB	
1-GB	1-GB			
1-GB	512-MB		512-MB	
2-GB	1-GB		1-GB	
2-GB	512-MB	512-MB	512-MB	512-MB
4-GB Maximum	1-GB	1-GB	1-GB	1-GB

Small Form Factor



Microtower



	Quantity Supported	Position Supported	Controller
Small Form Factor			
Diskette Drives (optional)	1	1	Diskette
Storage Drive Bay	1	3	IDE
3.5" SMART III Ultra ATA Hard Drives	2	1, 2	IDE
Microtower			
Diskette Drive	1	3	Diskette
5.25" Storage Drive Bays	2	1, 2	IDE
3.5" Storage Drive Bays	3	4, 5, 6	IDE

Base Unit Contents	Small Form Factor	Microtower
Processor	Intel Pentium 4 or Intel Celeron-D	
CPU Bus Speed Supported	800-MHz, 533-MHz or 400-MHz FSB depending on processor speed	
Coprocessor	Integrated	
Standard L2 Cache – Pentium 4	1024-KB	
L2 Cache Architecture/Speed – Pentium 4	Full core clock speed	
Cache Upgradeable – Pentium 4 and Celeron-D	Not upgradeable – Integrated into Processor	
System board with Intel 865GV Chipset with Integrated graphics	X	
Cables	ATA Cable	
Quick Setup Poster	X	
Product Documentation on CD	X	
Operating System CD	X	
Restore CD	X	
Power Cord	X	
Keyboard	X (PS/2)	
Mouse	X (PS/2)	
Memory Expansion Slots	4 DIMMs	
Memory Type Supported	DDR (ECC not supported by Chipset)	
Memory Speed Supported	DDR Synch DRAM PC2100 (266-MHz) non-ECC or DDR Synch DRAM PC2700 (333-MHz) non-ECC or DDR Synch DRAM PC3200 (400MHz) Non-ECC	
Maximum Memory	4-GB	
Memory Parity	Not Needed for non-ECC	
ECC Memory	Not Supported by chipset	
Serial Presence Detect Support	Supported	
PCI slots	3 low profile	3 full height
AGP slots	none	
Bays	Total Bays = 3	Total Bays = 6
Internal	(1) 3.5 inch ATA Hard Drive	(2) 3.5 inch ATA Hard Drive
External	(1) 5.25 inch half-height (1) 3.5 inch third height	(2) 5.25 inch half-height (2) 3.5 inch third height
Parallel Port	1	
Serial Port	1 - with 2nd available as option	
USB Keyboard	Optional	
USB Mouse	Optional	
PS/2 Keyboard	1	
PS/2 Mouse	1	
VGA Adapter	1	
Chassis Dimensions (H x W x D) Inches	3.95 x 13.3 x 15.1 In tower position with stand: 14.4 x 3.95 x 15.1	14.5 x 6.88 x 16.31
System Weight	22.2 lb	24 lb
System Volume	13 liters	27 liters
Shipping Weight	29 lb	34 lb
Weight Supported	75 lb	NA
Hard Drive Interfaces Supported	2 ULTRA ATA/100 interfaces	

Hard Drive Controller (PCI) Supported	ULTRA ATA 100/66/33
Serial-ATA	none

System Board	Small Form Factor	Microtower
Architecture	P4/PCI	
Chipset	Intel 865GV Chipset	
I/O Controller	SMSC LPC47B387	
System Board Form Factor	UATX	
Processor Socket – 478 Pin ZIF	X	
DIMM Connectors (2.5V)	4	
AGP Connector (1.5V)	none	
Integrated AGP Graphics	Intel	
PCI Connectors (5.0V)	3	
Flash ROM	X	
AC97 Integrated Audio	X	
CD ROM IN (Audio)	X	
AUX IN (Audio)	X	
Clear CMOS Button	X	
CPU Fan Header	X	
Chassis Fan Header	X	
Chassis Speaker Header	X	
CMOS Battery Holder – Lithium	X	
Hood Lock Header	none	
Hood Sensor Header	none	
Multibay Header	none	
Integrated Broadcom NetXtreme Gigabit ethernet for HP	X	
Wake-On-Lan®	X	
ASF 1.0 (Alert Standard Format)	X	
Power Supply Header	X	
Power Switch, Power LED & Hard Drive LED Header	X	
Password Clear Header	X	
Riser Connector	none	
SCSI LED Header	none	
PCI extender that connects to System Board	none	

Technical Specifications

Chassis	Small Form Factor	Microtower
Color	Carbonite/Silver	
System Board Form Factors Supported	Standard mATX	
Cooling Solutions Supported	X	
Power Supply Fan (Variable Speed)	X	
Processor Fan-Heatsink (Variable Speed)	X	
Chassis Fan	—	X
Slots Supported	3 low profile	3 full-height
AGP Slot	none	
Front I/O	Front Headphone, Microphone, and 2 USB 2.0 Standard	
Rear I/O	4 USB 2.0, 1 standard serial port, 1 optional serial port, 1 parallel port, PS/2 keyboard and mouse, 1 RJ-45, 1 VGA, Audio In, Audio Out/Headphone, stereo Microphone	
Internal Speaker	X	
Power Supply	185W Power Supply – PFC (115v/230v line switch)	240W Power Supply – PFC (115v/230v line switch)
Security Locks Supported	Kensington Cable Lock Provision (Lock not included) Hood Cover Security Loop (Lock not included)	
Security Loop hole diameter	.236 inches	

Unit Environment and Operating Conditions	
General Unit Operating Guidelines • Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range. • Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow. • Never restrict airflow into the computer by blocking any vents or air intakes. • Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air. • Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow. • If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.	
Temperature Range	Operating Temperature: 50° to 95° F (10° to 35° C) Non-operating Temperature: 22° to 140° F(30° to 60° C)
Relative Humidity	Operating Humidity 10% to 90% (non condensing at ambient) Non-operating Humidity 5% to 95% (non condensing at ambient)
Maximum Altitude (unpressurized)	10,000 ft (3048 m) 30,000 ft (9144 m)
NOTE: Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.	

Technical Specifications

Interfaces	Small Form Factor	Microtower
I/O Chip	SMSC LPC47B387	
Serial Port	1 standard, 2nd via option	
Parallel Port	1	
PS/2	1 Keyboard and 1 Mouse	
USB (2.0)	6 ports (4 rear/2 front)	
RJ-45 10/100/1000 Network	X	
Keyboard	X (PS/2)	
Mouse	X (PS/2)	
Multibay	none	
Video (VGA)	X	
Audio	X	

Power Supply	Small Form Factor	Microtower
Power Supply	Custom Power Supply – PFC With in 230V (115v/230V line switch)	Custom Power Supply – PFC With in 230V (115v/230V line switch)
Full Ranging Input (No Line Select Switch)	—	
Active Power Factor Correction (APFC) (Input Current is nearly 1/2 a non-APFC PS)	—	
Passive Power Factor Correction (PFC)	X	
Operating Voltage Range	90 – 132/180 – 264 VAC	
Rated Voltage Range	100 – 127/200 – 240 VAC	
Rated Line Frequency	50/60 Hz	
Operating Line Frequency Range	47 – 63 Hz	
Rated Input Current	5A/2.5A	6A/3A
Maximum Rated Power	185W	240W
Heat Dissipation	Typical 256 btu/hr (65 kg-cal/hr) Maximum 971 btu/hr (245 kg-cal/hr	Typical 256 btu/hr (65 kg-cal/hr) Maximum 1260 btu/hr (318 kg-cal/hr
Power Supply Fan	60mm variable speed	92mm variable speed
Energy Star Compliant	X	
FEMP Standby Power Compliant (<2W in S5 – Power Off)	X	
Power Consumption in ES Mode – Suspend to RAM (S3) (Instantly Available PC)	2.5W to 3W	
Processor/Cache Memory Power-Down (S3)	< 3W	< 3W
Environmental and Mechanical Engineering Support Center	http://env-webserver.ccm.cpqcorp.net/EMESC/default.htm	

ROM Features	Description	Small Form Factor	Microtower
Instantly Available PC (Suspend to RAM – S3)	Allows for very low power consumption with quick resume time	X	X
ROM Based F10 Setup	Review and customize BIOS settings	X	X

Remote System Installation via F12 (PXE) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system	X	X
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS	X	X
CMOS Archive and CMOS Restore	Holding down the power button restores the last known good BIOS settings (from previous restart) if the system gets into a locked state after configuration changes are made	X	X
Auto Setup when New Hardware Installed	System automatically detects addition of new hardware	X	X
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enable or disables serial, parallel, USB, audio, and network ports	X	X
Removable Media Write/Boot Control	Prevents ability to boot from removable media on supported devices (and can disable writes to media on supporting devices)	X	X
Network Server Mode	Allows for secured keyboard-less operation	X	X
Power-On Password	Prevents an unauthorized person from booting up the computer	X	X
Setup Password	Prevents an unauthorized person from changing the system configuration	X	X
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. SSM and Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup	X	X
Memory Change Alert (Requires Insight Management Agent)	Alerts management console if memory is removed or changed	X	X
Thermal Alert (Requires Insight Management Agent)	Monitors the temperature state within the chassis. Three modes: • NORMAL – normal temperature ranges • ALERTED – excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown • SHUTDOWN – excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs	X	X
Master Boot Record Security	Detects changes to MBR and optional restoration, useful in protecting from viruses	X	X
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console	X	X
Remote Wakeup	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.	X	X
ACPI (Advanced Configuration and Power Management Interface)	• Allows the system to wake from a low power mode • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system	X	X
Keyboard-less Operation	The system can be operated without a keyboard	X	X
SMBIOS	System Management BIOS, previously known as DMI BIOS, for system management information	X	X

Environmental and Mechanical Engineering Support Center (EMESC) – Intranet Web Site only	http://env-webserver.ccm.cpqcorp.net/EMESC/default.htm

Software	Description	Small Form Factor	Microtower
Preinstalled Software			
Microsoft Windows XP Professional SP1a		X	X
Microsoft Windows XP Home SP1a		X	X
Computer Setup Utility		X	X
Diagnostics for Windows		X	X
Microsoft Internet Explorer		X	X

Initial Configuration and Deployment	Description	Small Form Factor	Microtower
Altiris eXpress Solutions (30-day trial version)	A suite of solutions that focus on business needs in four areas, saving time and freeing resources to address other crucial issues: • Deployment & Migration • Software & Operations Management • Inventory & Asset Management • Help Desk & Problem Resolution	Pre-loaded	Pre-loaded
PC Transplant Pro (30-day trial version)	Makes transferring the files and settings that make your PC unique quick and intuitive process	Pre-loaded	Pre-loaded
System Software Manager (free)	Detects and updates BIOS, device drivers, and management agent versions on your networked PCs	X	X
Replicated Setup	Saves BIOS settings to diskette or USB disk-on-key in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering ROM-based F10 setup	X	X
Support Software CD	—	X	X
Software Restore CD	Restores computer to its original factory shipping image	X	X
Asset Tag	• Repository for storing company-specific property asset numbers for easy tracking • Initially set equal to the system serial number • Stored in a protected section of non-volatile memory that can be accessed and modified with the F10 Setup program	X	X
DIMM Serial Presence Detect	Detects whether or not memory DIMMs are present and their type	X	X
Hard drive serial number, model, and manufacturer	Hard drive manufacturer, model, and serial number is stored in the hard drive firmware and reported in ROM-based F10 setup	X	X
Monitor serial number, model & manufacturer	—	X	X
System serial number, model, & manufacturer	System serial number, model, & manufacturer stored in a non-volatile memory and can be retrieved with management SW or viewed in ROM-based F10 setup	X	X

ROM revision levels	• Identifies system ROM revision levels and reports in ROM-based F10 setup • Version is stored in an industry standard memory location (SMBIOS) so that management SW applications can use and report this information	X	X
System board revision level	• Allows management SW to read the revision level of the system board • Revision level is digitally encoded into the hardware and cannot be modified	X	X
Memory Change Alert	Alerts management console if memory is removed or changed	X	X
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen	X	X

Security Features	Description	Small Form Factor	Microtower
Mechanical Hood Security Provision	Security Loop	X	X
Kensington Lock Support	Kensington lock slot on the chassis	X	X
Cable Lock Provision	Physically secure computer hardware from theft	X	X
Serial, Parallel, USB Enable/Disable	Enable or disable serial, parallel or USB ports and hide them form the operating system	X	X
Removable Media Write/ Boot Control	Prevents the computer from being booted from removable media on supported devices (and can disable writes to media)	X	X
Power-On Password	Prevents an unauthorized person from booting up the computer	X	X
Setup Password	Prevents an unauthorized person from changing the system configuration	X	X

Fault Notification and Recovery	Description	Small Form Factor	Microtower
SMART Hard Drives, Fault Notification, & Prefailure Warranty	• Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure	X	X
Surge Tolerant Full Ranging Power Supply	Withstands power surges up to 2000V	X	X
Thermal Sensor	Monitors the temperature within the chassis • NORMAL – normal temperature ranges • ALERTED – excessive temperatures are detected. Raises a flag so that appropriate action can be taken to avoid shutdown or provide for a smoother system shutdown • SHUTDOWN – excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs	X	X

Ultra ATA Integrity Monitoring (CRC Checking)	Provides data transfer verification and proactive notification of hard drive data transmission problems with recommendations for enhancing system performance. It detects all the following errors types: • single bit errors • double bit errors • an odd number of errors • error bursts up to 32-bits long	X	X

System Software Updating	Description	Small Form Factor	Microtower
Product Change Notification	• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile. • PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition. • Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support	X	X
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console	X	X
Remote Wakeup/ Remote Shutdown	• System administrators can power on, restart, and power off a client computer from a remote location. • Enables cost-effective power consumption when the administrator needs to distribute software, perform security management, or update the ROM.	X	X
ROM Based Setup (F10) and Start-up Diagnostics	—	X	X
Support Software CD & WWW	—	X	X

Other Features	Description	Small Form Factor	Microtower
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • Allows the system to wake from a low power mode. • Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.	X	X
SMBIOS	System Management BIOS, previously known as DMI BIOS, for system management information	X	X
Wired for Management Support	Intel-driven, industry-wide initiative to make Intel architecture-based PCs, servers and mobile computers more inherently manageable right out of the box and over the network	X	X
Dual-State Power Button	Power button acts as either an on/off button and suspend-to-sleep button	X	X

Technical Specifications

Serviceability Features of System	Description	Small Form Factor	Microtower
Dual Color Power LED on Front of Computer (Indicates Normal Operations and Fault Conditions)	—	X	X
Diagnostic LED Explanation Table	Number of 1-second red LED blinks followed by 2-second pause, then repeats: 2-processor thermal protection activated 3-processor not installed 4-power supply failure 5-memory error 6-video error 7-PCA failure (ROM detected failure prior to video) 8-invalid ROM, bootblock recover mode	X	X
System/Emergency ROM Flash Recovery with Video	Recovers corrupted system BIOS.	X	X
Configuration Record SW	—	X	X
Over-Temp Warning on Screen (Requires IM Agents)	—	X	X
OS CD (Restore OS CD)	Restores computer to its original factory shipping image	X	X
Restore CD	Restores the computer to its original factory shipping image	X	X
Flash ROM	—	X	X
3.3V Aux Power LED on System PCA	—	X	X
Dual Function 5V Aux Power LED (ON)/PS_ON LED (OFF) on System PCA	—	X	X
Diagnostic Power Switch LED on board	—	X	X
Clear Password Jumper	—	X	X
Clear CMOS Button	—	X	X
CMOS Battery Holder for easy Replacement	—	X	X
Processor ZIP Socket for easy Upgrade	—	X	X
DIMM Connectors for easy Upgrade	—	X	X
NIC LEDs (integrated) (Green & Amber)	Used to determine NIC status	X	X

Technical Specifications

Serviceability Features of Chassis	Description	Small Form Factor	Microtower
Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions	—	X	X
ASF 1.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments	X	X
Front power switch	—	X	X
Green Pull Tabs, and Quick Release Latches for easy Identification	—	X	X
Color coordinated cables and connectors		X	X
System memory can be upgraded without removing the system board or any internal components	Eases memory upgrading	X	X
Tool-less Hood Removal	Eases entry to the chassis without use of special tools	X (single latch)	X (thumb screw)
Tool-less Hard Drive, CD & Diskette Removal	—	X	X
Tool-less System Board Removal	No special tools required for system board removal or maintenance	X	X
Towerable	Product can be oriented as a tower (in addition to desktop orientation)	X	X
Universal Tower Stand	Necessary to safely orient as a tower	X (required for use as tower)	— (Not needed to tower)
Drive Self Tests (DPS)	• Drive Protection System • A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user. • Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced. • The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures	X	X
DPS Access through F10 Setup during Boot		X	X
DPS Access through Diagnostics for Windows		X	X
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	• Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted • Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count • By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure	X	X
SMART I – Drive Failure Prediction		X	X
SMART II – Off-Line Data Collection		X	X
SMART III – Off-Line Read Scanning with Defect Reallocation		X	X

Service and Support	On-site Warranty and Service Note 1: This three-year, limited warranty and service offering delivers three years of on-site, next business-day Note 2 service for parts and labor and includes free telephone support Note 3 24 x 7. Global coverage Note 2 ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering.
	NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.
	NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
	NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

AC97 Integrated ADI 1981B Audio	Type	Integrated
	AC '97 Stereo Codec	Yes
	FM Synthesis Support	Yes – Yamaha XG Lite
	OPL3 FM Synthesis Support	Yes
	Sound Blaster Compatibility	Yes
	Audio Jacks	Microphone-In (20-K ohm Input Impedance); rear stereo and front analog microphone ports available except for USDT which has front stereo microphone only Line-In (12-K ohm Input Impedance) Line-Out * (less than 800 ohms Output Impedance, expects at least a 10-K ohm load) Headphone-Out (2.5 Ohms Output Impedance, expects at least a 32 ohm load)
	NOTE: *Internal Speaker Amplifier is for Internal Speaker only. External Speakers need to be powered externally.	
	Sampling	7 kHz – 48 kHz
	Wavetable Syntheses (software)	Yes – GM and FM Midi Support, Direct Music and Down Loadable Soundset (4 Meg DLS Level 1 and 2 Support)
	3D Positional Sound	No
	Digital Audio	Yes
	Analog Audio	Yes
	Number of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
	Internal Audio Speaker Power Rating	3W
	Internal Speaker	Yes
	Hardware Equalizer for Internal Speaker	Fixed 7 Band ParametricEQ
	External Speaker Jack (Line-Out)	Yes

Integrated Broadcom NetXtreme Gigabit Ethernet NIC	Connector	RJ-45
	Controller	Broadcom 5782 PCI LAN Controller
	Memory	Integrated 96Kb frame buffer memory
	Data rates supported	10/100/1000 Mbps
	Compliance	IEEE 802.1A, 802.1P, 802.1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
	Bus architecture	PCI 2.2
	Data path width	32-bit, 33/66 MHz bus interface
	Data transfer mode	Bus-master DMA
	Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
	Power requirement	1.48 watts @ +3.3V AUX supply with 5V tolerance
	Boot ROM support	Yes
	Network transfer rate	10BASE-T (half-duplex) 10 Mbps
		10BASE-T (full-duplex) 20 Mbps
		100BASE-TX (half-duplex) 100 Mbps
		100BASE-TX (full-duplex) 200 Mbps
		1000BASE-T, 1000 Mbps
	Environmental	Operating temperature 32° to 131° F (0° to 55° C)
		Operating humidity 85% at 131° F (55° C)
	Dimensions	4.7 x 2.0 x 0.08 in (12 x 5 x 1.9 cm)
	Operating system driver support	Microsoft Windows NT 4.0, Microsoft Windows 98, Microsoft 2000, Microsoft XP, Linux 2.2, Linux 2.4
	Management capabilities	ACPI, WOL and DMI 2.0, PXE 2.0, WfM 2.0
	Alerting	ASF 1.0

Integrated Intel Extreme Graphics 2	3D/2D Controller	Support is fully compliant with Microsoft standard API such as Direct Draw, GDI/GDI+ and Direct Show
	VGA Controller	Integrated
	Bus Type	None
	RAMDAC	Integrated 350-MHz DAC
	Memory	Graphics memory is shared with system memory. Graphics memory usage can vary from 8 - 64MB depending on the amount of system memory installed and system load. 16MB is pre-allocated for graphics use at system boot time. Additional memory is allocated for graphics using Intel's Dynamic Video Memory Technology (DVMT) to balance the optimum amount of memory between graphics and other system use. With a 128MB system, graphics memory usage will be 8MB -32MB depending on system load. With 256MB or more, graphics memory usage will be 8MB - 64MB depending on system load.
	Controller Clock Speed	266 MHz
	Overlay Planes	Single Overlay support with 5x3 filtering
	Max Color Depth	32-bits/pixel
	Maximum Vertical Refresh Rate	85Hz at up to 1920 x 1440, 75Hz at 2048 x 1536. Varies with mode and configuration. See table below
	Multi-display Support	Support for one CRT via the motherboard's VGA connector
	Graphics API Support	Complete Microsoft DirectX® support, including DirectX 8.1; complete OpenGL® 1.3 support. Compatible with DirectX 9.

Resolutions Supported (At various color depths & memory configurations) (NOTE: Refresh rates higher than 85Hz may be obtainable in some modes and configurations but are not recommended.)

Resolution	Maximum Refresh Rate (Hz) DR266 Single Channel (8/16/32 bits/pixel)	Maximum Refresh Rate (Hz) DDR 266 Dual/DDR 333 Single Channel (8/16/32 bits/pixel)	Maximum Refresh Rate (Hz) DDR 333 Dual Channel (8/16/32 bits/pixel)
640 x 480	85/85/85	85/85/85	85/85/85
800 x 600	85/85/85	85/85/85	85/85/85
1024 x 768	85/85/85	85/85/85	85/85/85
1152 x 864	85/85/85	85/85/85	85/85/85
1280 x 720	85/85/85	85/85/85	85/85/85
1280 x768	85/85/85	85/85/85	85/85/85
1280 x 960	85/85/85	85/85/85	85/85/85
1280 x 1024	85/85/85	85/85/85	85/85/85
1400 x 1050	85/85/85	85/85/85	85/85/85
1600 x 900	85/85/85	85/85/85	85/85/85
1600 x 1200	85/85/85	85/85/85	85/85/85
1856 x 1392	75/75/60	75/75/60	75/75/60
1920 x 1080	85/85/75	85/85/85	85/85/85
1920 x 1200	75/75/60	75/75/75	75/75/75
1920 x 1440	85/85/60	85/85/60	85/85/60
2048 x 1536	75/75/NA	75/75/NA	75/75/60

7200 rpm SMART III Ultra 40-GB ATA/100 Hard Drives	Capacity	40 GB	
	Dimensions (H x W)	1.0 x 3.5 in (2.5 x 8.9 cm)	
	Interface	Ultra ATA/100	
	Transfer Rate Synchronous (Maximum)	100 MB/s	
	Seek Time (typical reads, including settling)	Single Track	0.8 ms
		Average	9.0 ms
		Full-Stroke	17.0 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	78,140,160	
	Operating Temperature	41° to 131° F (5° to 55° C)	
80-GB	Capacity	80 GB	
	Dimensions (H x W)	1.0 x 3.5 in (2.5 x 8.9 cm)	
	Interface	Ultra ATA/100	
	Transfer Rate Synchronous (Maximum)	100 MB/s	
	Seek Time (typical reads, including settling)	Single Track	0.8 ms
		Average	9.0 ms
		Full-Stroke	17.0 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	156,301,488	
	Operating Temperature	41° to 131° F (5° to 55° C)	
120-GB	Capacity	120 GB	
	Dimensions (H x W)	1.0 x 3.5 in (2.5 x 8.9 cm)	
	Interface	Ultra ATA/100	
	Transfer Rate Synchronous (Maximum)	100 MB/s	
	Seek Time (typical reads, including settling)	Single Track	0.8 ms
		Average	9.0 ms
		Full-Stroke	17.0 ms
	Rotational Speed	7200 rpm	
	Logical Blocks	234,441,648	
	Operating Temperature	41° to 131° F (5° to 55° C)	

HP USB 2004 Standard Keyboard	Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
		Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
		Weight	2 lb (0.9 kg) minimum
	Electrical	Operating voltage	+ 5VDC ± 5%
		Power consumption	50-mA maximum (with three LEDs ON)
		System interface	USB Type A plug connector
		ESD	CE level 4, 15-kV air discharge
		EMI - RFI	Conforms to FCC rules for a Class B computing device
		Microsoft® PC 99 - 2001	Functionally compliant
	Mechanical	Languages	38 available
		Keycaps	Low-profile design
		Switch actuation	55-g nominal peak force with tactile feedback
		Switch life	20 million keystrokes (using Hasco modified tester)
		Switch type	Contamination-resistant switch membrane
		Key-leveling mechanisms	For all double-wide and greater-length keys
		Cable length	6 ft (1.8 m)
		Microsoft PC 99 - 2001	Mechanically compliant
		Acoustics	43-dBA maximum sound pressure level
	Environmental	Operating Temperature	50° to 122° F (10° to 50° C)
		Non-operating Temperature	-22° to 140° F (-30° to 60° C)
		Operating Humidity	10% to 90% (non-condensing at ambient)
		Non-operating Humidity	20% to 80% (non-condensing at ambient)
		Operating shock	40 g, six surfaces
		Non-operating shock	80 g, six surfaces
		Operating vibration	2-g peak acceleration
		Non-operating vibration	4-g peak acceleration
		Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
		Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Operating system support	Windows® 2000 and Windows XP	
	Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
	Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

Technical Specifications - Input/Output Devices

2-Button Scroll Mouse (PS/2 or USB)	Scroll Wheel	8 mm	
	Maximum Rotation Speed	30 mm/s	
	Switch Type	Light force micro-switch	
	Switch Life	1 million operations	
	Mechanical Life	Minimum 200,000 revolutions	
	Environmental	Operating Temperature	50° to 122° F (10° to 50° C)
		Non-operating Temperature	-22° to 140° F (-30° to 60° C)
		Operating Humidity	10% to 90% (non condensing at ambient)
		Non-operating Humidity	20% to 80% (non condensing at ambient)
		Operating Shock	40 g, 6 surfaces
		Non-operating Shock	80 g, 6 surfaces
		Operating Vibration	2 g peak acceleration
		Non-operating Vibration	4 g peak acceleration
	Electrical	Operating Voltage	+ 5VDC ± 10%
		Power Consumption	15mA
		System Consumption	PS/2 mini-din connector
		ESD	CE level 4, 15 kV air discharge
		EMI-RFI	Conforms to FCC rules for a Class B computing device
		PC98	Functionally compliant
	Mechanical	Resolution	400 ± 20% DPI
		Tracking Speed	10 in/s maximum
		Acceleration	100 in/s
		Switch Actuation	85 g nominal peak force
		Switch Life	1,000,000 operations (using Hasco modified tester)
		Cable Length	2 m
		PC98-99	Mechanically compliant
	Regulatory Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BCIQ, C-Tick	

48X Max CD-ROM Drive	**Interface**	ATAPI IDE
	Data Buffer	16.6 Mbps
	Data Transfer Rate	Sustained—150 Kbps minimum (audio) Variable (CD)—3,000 to 7,200 Kbps
	Disk Rotation Technology	CAV (Constant Angular Velocity)
	Access Time (ms)	Random: <100 ms Full-stroke seek: <150 ms
	Average Access Time	< 80 ms
	Cache Buffer (standard/maximum)	128 KB
	Disk Formats Read	Multi-session Photo CD, multi-read CD-ROM, CD text, audio CD, CD-I, CD-RW, CD-R, CD-Extra, CD-ROM XA
	Disk Formats Written	None
	Disk Capacity (CD)	650 MB
	Block Size	Mode 1—2,048 bytes Mode 2—2,340/2,336 bytes CD-DA—2,352 bytes CD-XA—2,328 bytes
	Diameter	12 cm; 8 cm
	Thickness	1.2 mm
	Track Pitch	1.6 µm
	Audio Output Level	Line-out—0.7 V @ 47 Kohm Headphone—0.6 V @ 32 ohm
	Startup Time	<7 seconds (typical); < 30 seconds with multi-session
	Operating Conditions	**Temperature** 41° to 113° F (5° to 45° C) **Relative Humidity** 10% to 80%
	Dimensions (H x W x D, maximum)	1.7 x 5.9 x 8.2 in (4.3 x 15.0 x 20.8 cm)
	Weight	2.6 lb (1200 g)
	MPEG Playback Graphics Solution Support	None

48X/32X/48X CD-RW Drive	**Orientation**	Either horizontal or vertical
	Disc Loading Mechanism	Half-height, tray load
	Interface Type	ATAPI IDE
	Dimensions—external (W x H x D)	7.99 x 5.88 x 1.71 in (203 x 149.5 x 43.5 mm)
	Weight	2.6 lb (1.2 kg)
	Disc Diameter	12 cm, 8 cm
	Disc Thickness	1.2 mm
	Track Pitch	1.6 m m
	Disc Centre Hole Diameter	15 mm

Reference Scanning Velocity	1.2 m/s	
Recording/Playing Time	80 minutes with CD-R media	
Read Only Disc Prameters	Formats and Modes Supported	CD-ROM – Mode 1; CD-ROM XA – Mode 2 (forms 1 and 2); CD digital audio; CD Extra; CD-I – Mode 2 (forms 1 and 2) and CD-I-Ready; Photo CD (single and multi-session); video CD
	Capacity	185 MB (Mode 2, 8cm); 540 MB (Mode 1, 12 cm); 650 MB (Mode 2, 12 cm); 700 MB (Mode 2, 12 cm)
	Block Size	Mode 1 – 2,048 and 2,352 bytes; mode 2, form 1 – 2,048; 2,328; 2,336; 2,340 and 2,352 bytes; mode 2, form 2 – 2,328; 2,336; 2,340 and 2,352 bytes; CD-DA – 2,352 and 2,368 bytes
Writeable Disc Parameters	Disc Type	CD-R and CD-RW
	Write Methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
	Format and Modes Supported	CD-ROM (mode 1); CD-ROM XA (mode 2, forms 1 and 2); CD digital audio, CD-I (mode 2, forms 1 and 2); video CD
	Capacity	185 MB (Mode 2, 8cm); 540 MB (Mode 1, 12 cm); 650 MB (Mode 2, 12 cm); 700 MB (Mode 2, 12 cm)
	Block Size	Mode 1 – 2,048 bytes; mode 2, form 1 – 2,048 and 2,352 bytes; mode 2, form 2 – 2,352 bytes; CD-DA – 2,352 bytes
Access Times (typical)	Random	< 120 ms
	Full Stroke	< 200 ms
Maximum Data Transfer Rates	CD-RW Write	4800 KB/s (32X) Max
	CD-ROM, CD-R read	7200 KB/s (48X) Max
	CD-RW read	7200 KB/s (32X) Max
	CD-R write	7200 KB/s (48X) Max
Data Transfer Modes	ATA PIO mode 4 (16.7MB/s); ATA multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA mode 0 (16.7 MB/s); ATA UltraDMA mode 1 (24 MB/s); ATA UltraDMA mode 2 (33 MB/s) – default.	
Cache Buffer	2 MB (minimum)	
Start-up Time (single)	< 7 seconds typical	
Start-up Time (multi-session)	< 30 seconds typical	
Stop Time	< 4 seconds	

	Power	**Source**	Four-pin, DC power receptacle
		DC power requirement	5 VDC ± 5%—100 mV ripple p-p 12 VDC ± 5%—200 mV ripple p-p
		DC current	5 VCD — < 1A (typical) < 1600 mA (maximum)
			12 VCD — < 600 mA (typical) < 1.4A (maximum)
			Total Drive Power (Standby mode) — < 2.5 watt
	Audio Output Level	0.7 Vrms	
	Configuration Jumper Block	Master, slave and cable select modes	
	Data Interface Connector	50-pin IDE interface	
	Environmental (all conditions, non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
		Relative Humidity (operating)	10% to 90%
		Maximum Wet Bulb Temperature (operating)	84° F (29° C)
16X/40X DVD-ROM	**Height**	5.25-in, half-height	
	Interface Type	ATAPI	
	Dimensions– External, Excluding Bezel (W x H)	5.88 x 1.71 in (149.5 x 43.5 mm)	
	Disc Diameter	12 cm, 8 cm	
	Disc Thickness	1.2 mm	
	Track Pitch	1.6 μm (CD), 0.74 μm (DVD)	
	Disc Centre Hole Diameter	15 mm	
	Disc Formats	DVD-ROM (single and dual layer); DVD-video; DVD-R version 1.0 and 2.0; DVD-RW version 1.0 and 1.1; DVD-R multi-border; DVD+RW; DVD+R ; CD-ROM Mode 1 and 2; CD-DA; CD-ROM XA Mode 2, Form 1 and 2; CD-extra; CD-text; CD-I Mode 2, Form 1 and 2; CD-I ready; video CD, CD-bridge; PhotoCD (single and multi-session); CD-R; CD-RW	
	Disc Capacity	**DVD-ROM**	4.7 GB (DVD-5), 8.54 GB (DVD-9), 9.4 GB (DVD-10), 3.95 GB (DVD-R version 1.0), 4.7 GB (DVD-R version 2.0), 4.7 GB (DVD-RW version 1.0 and 1.1), 4.7 GB (DVD+RW), 4.7 GB (DVD+R)
		CD-ROM	40 MB (Mode 1, 12 cm), 640 MB (Mode 2, 12 cm), 700 MB (80 minimum CD-R and CD-RW), 180 MB (8 cm)
	Block Size (bytes)	DVD-ROM – 2048; CD-ROM Mode 0 – 2352; CD-ROM Mode 1 – 2352, 2340, 2336, 2048; CD-ROM Mode 2 – 2352, 2340, 2336, 2048	
	Access Times (typical reads, including settling)	**DVD-ROM Single Layer**	120 ms (typical)
		CD-ROM Mode 1	90 ms (typical)
		Full Stroke DVD	240 ms (seek) (typical)
		Full Stroke CD	160 ms (seek) (typical)

Technical Specifications - Optical Storage

Maximum Data Transfer Rates	CD-ROM Read	6000 KB/s (40X) Max
	DVD-ROM Read	21,600 KB/s (16X) Max
Data Transfer Modes	PIO Mode 4 (16.6 MB/s); Multi-word DMA mode 2 (16.6 MB/s); UltraDMA Mode 3 (44.4 MB/s)	
Power	Source	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5% – 100 mV ripple p-p
		12 VDC ± 5% – 200 mV ripple p-p
	DC Current	5 VDC – <800 mA typical, < 1000 mA maximum
		12 VDC – < 870 mA typical
Audio Output Level	0.7 Vrms (typical)	
Configuration Jumper Block	Master, slave, and cable select modes	
Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
Environmental (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 90%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)
Certifications, Approvals	MMC II support, multi-read certification, Microsoft WHQL certification, ACA AS/NZS 3548 class B, CNS 13438, C.I.S.P.R. Pub 22, TUV or VDE EN60950, EN 55022, EN55024, SEMKO, NEMKO, DEMKO, FIMKO, EN 60825-1, UL 60950, and CSA C22.2 60950-2000.	
Operating Systems Supported	Microsoft Windows 2000, Windows XP Professional, Windows XP Home	
Kit Contents	16X/40X DVD-ROM Drive, Roxio CinePlayer software, and installation guide.	

48X/32X/48X/16X Combo CD-RW/DVD-ROM	5.25-inch, half-height, tray-load	
	Colour	Carbonite
	Orientation	Either horizontal or vertical
	Interface Type	ATAPI
	Dimensions (W x H x D)	5.77 x 1.71 x 7.36 in (146.5 x 43.5 x 187 mm) (external, excluding bezel)
	Disc Diameter	12 cm, 8 cm
	Disc Thickness	0.05 in (1.2 mm)
	Track Pitch	1.6 um (CD), 0.74 um (DVD)
	Disc Centre Hole Diameter	0.6 in (15 mm)
	Reference Scanning Velocity	1.2 m/s (CD); 3.49 m/s (DVD SL); 3.84 m/s (DVD DL)

Read Only Disc Parameters	Formats and Modes Supported	CD-ROM—Mode 1; CD-ROM XA-Mode 2 (forms 1 and 2); CD-Bridge; CD digital audio; CD Extra; CD-I—Mode 2 (forms 1 and 2) and CD-I-Ready; Photo CD (single and multi-session); video CD; DVD (single- and double-layer); DVD-R; DVD-RW; DVD-RW Multi-Border; DVD+R; DVD+R Multi-Session, and DVD+RW
	Capacity	180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (Mode 2, 12 cm); 4.7 GB (DVD-5); 8.54 GB (DVD-9); 9.4 GB (DVD-10)
	Block Size	Mode 1– 2,048 and 2,352 bytes; mode 2, form 1– 2,048; 2,328; 2,336; 2,340 and 2,352 bytes; mode 2, form 2-2,328; 2,336; 2,340 and 2,352 bytes; CD-DA-2,352 bytes; DVD-2,048 bytes
Writeable Disc Parameters	Disc Type	CD-R and CD-RW
	Write Methods	Disc at Once, Track at Once, Session at Once, Variable Packet, Fixed Packet
	Format and Modes Supported	CD-ROM (mode 1); CD-ROM XA (mode 2, forms 1 and 2); CD digital audio, CD-I (mode 2, forms 1 and 2); video CD; CD-Bridge; Video CD
	Capacity	180 MB (mode 2, 8 cm); 540 MB (mode 1, 12 cm); 650 MB (mode 2, 12 cm); 700 MB (mode 2, 12 cm)
	Block Size	CD-DA?,352 bytes; mode 0 – 2,336 and 2,352 bytes; mode 1– 2,048 and 2,352 bytes; mode 2– 2,336 and 2,352; mode 2, form 1– 2,048 and 2,352 bytes; mode 2, form 2– 2,324 and 2,352 bytes
Access Times (typical reads, including settling)	Random DVD	< 140 ms (typical)
	Random CD	< 125 ms, (typical)
	Full Stroke DVD	< 250 ms (seek)
	Full Stroke CD	< 210 ms (seek)
Maximum Data Transfer Rates	CD-R write	7200 KB/s (48X) Max
	CD-RW write	1500 KB/s (10X) Max
	CD-ROM, CD-R, CD-RW read	7200 KB/s (48X) Max
	DVD ROM read	21,632 KB/s (16X) Max

	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA mode 0 (16.7 MB/s); ATA UltraDMA mode 1 (24 MB/s), mode 2 (33 MB/s); ATA UltraDMA Mode 3 44 Mbytes/s (default)	
		Cache Buffer	2 MB (minimum)
		Startup Time (single)	< 7 seconds (typical)
		Startup Time (multi-session)	< 30 seconds (typical)
		Stop Time	< 4 seconds
	Power	Source	Four-pin, DC power receptacle
		DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
		DC Current	5 VDC (< 1000 mA typical, < 1600 mA maximum) 12 VDC (< 600 mA typical, < 1400 mA maximum)
		Total Drive Power (standby mode)	< 2.5 Watt
	Audio Output Level	0.7 Vrms (typical)	
	Configuration Jumper Block	Master, slave, and cable select modes	
	Data Interface Connector	40-pin, shrouded and keyed, flat ribbon	
	Environmental (all conditions, non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)
		Relative humidity (operating)	10% to 90%
		Maximum wet bulb temperature (operating)	86° F (30° C)
	Certifications, Requirements	MPC-3 compliant, multi-read requirements, ACA AS/NZS 3548, ANSI C63.4-1992, ATAPI Spec SFF-8020, ATA Spec X3T9.2, CB Bulletin No. 92A, CSA C22.2 No. 950-1995, C.I.S.P.R. Pub 22, EMKO-TSE 207/94, TUV or VDE EN60 950, EN60825-1, Microsoft PC2001 certification, Microsoft Logo for Windows XP, 2000, and NT4	
	Operating Systems Supported	Microsoft Windows 2000, Windows XP Professional, Windows XP Home	
16X DVD+/-RW LightScribe Drive	Height	5.25-inch, half-height, tray-load	
	Orientation	Either horizontal or vertical	
	Interface type	ATAPI/EIDE	
	Disc recording capacity	8.5 GB DL or 4.7 GB standard	
	Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)	
	Weight (max)	2.6 lb (1.2 kg)	

Technical Specifications - Optical Storage

Write speed	DVD+R	Up to 16X
	DVD+RW	Up to 4X
	DVD+R DL	Up to 2.4X
	DVD-R	Up to 8X
	DVD-RW	Up to 4X
	CD-R	Up to 40X
	CD-RW	Up to 24X
Read speed	DVD+R/-R/+RW/ -RW/+R DL	Up to 8X
	DVD-ROM	Up to 16X
	CD-ROM, CD-R	Up to 40X
	CD-RW	Up to 32X
Access time (typical reads, including settling)	Random	DVD: < 130 ms (typical), CD: < 120 ms (typical)
	Full Stroke	DVD: < 240 ms (seek), CD: < 200 ms (seek)
	Startup Time	Single-session: < 15 seconds (typical), Multi-session: < 30 seconds (typical)
	Stop Time	< 4 seconds
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s -default)
Power	Source	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
		12 VDC (< 600 mA typical, 1400 mA maximum)
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	Line-Out	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative humidity	10% to 90%
	Maximum wet bulb temperature	86° F (30° C)
System configuration	Intel PentiumIII Processor or later with 128 MB of memory (required); 256 MB recommended 2-D or 3-D graphics cards on primary disk drive for operating system and application software; second disk drive for audio and video data	
Operating systems support	Microsoft Windows 2000, Windows XP Professional, Windows XP Home	

Regulatory approvals	MPC-3 compliant, multi-read requirements, ATA Spec X3T9.2, ATAPI Spec T13.1153D, ANSI C63.4-1992, UL 1950, ACA AS/NZS 3548, CB Bulletin No. 96A, CSA C22.2 No. 950-1995, CFR 47 C.I.S.P.R. Pub 22 Class B, DHHS/FDA, EMKO-TSE 07/94, TUV EN60950, EN60825-1, MIC, BSMI-CNS 13438, CE, Microsoft PC2001 certification, Microsoft Logo for Windows XP and 2000.
Option kit contents	16X DVD+/-RW LightScribe drive, LightScribe software, InterVideo WinDVD, InterVideo WinDVD Creator, Roxio Easy Media Creator 7, Dantz Retrospect Express Backup Software, installation guide, and DVD+R media.

Technical Specifications - Removable Storage

HP Drive Key II	Dimensions (HxWxD)	0.32 x 0.63 x 2.67 in (0.8 x 1.6 x 6.8 cm)	
	Storage Capacity	256 MB	
	Weight	0.05 lb (0.02 kg)	
	Transfer Rates	Read	Capable of 6.0 MB/s sustained read speed in USB 2.0 system
		Write	Capable of 6.0 MB/s sustained write speed in USB 2.0 system
	Operating Temperature	41° to 122° F (5° to 50° C)	
	Non-operating Temperature	-22° to 140° F (-30° to 60° C)	
	Operating System Support	Microsoft Windows 2000, Windows XP Professional, Windows XP Home. No driver is required for this device. Native support is provided by the operating system.	
	Option Kit Contents	HP Drive Key II, documentation	

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